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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

In the matter of)
Amendment of Part 90 of the)
Commission's Rules to Adopt)
Regulations for Automatic Vehicle)
Monitoring Systems)

PR Docket No. 93-61
RM 8013

**COMMENTS
OF
METRICOM, INC.**

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SUMMARY

Metricom, Inc. is a young, rapidly growing, technologically innovative company based in Los Gatos, California. Metricom has invested significant sums of money, time and energy to develop and manufacture sophisticated radio frequency transmitter and receiver systems which operate pursuant to Part 15 of the Commission's Rules.

Wide-Band LMS, as contemplated in the Notice, cannot co-exist without the threat of significant interference with Part 15 devices in the 902-928 MHz band. The Notice makes the Teletrac system architecture the de facto wide-band system architecture for LMS. Teletrac's architecture is very fragile and very susceptible to interference. Interference will come from all those sharing the 902-928 MHz band with LMS, including Part 15 devices.

Appendix A to these comments demonstrates that in the best of circumstances, a Part 15 spread spectrum device may cause interference to a Teletrac wide-band-type system within an 8.2 mile radius. In the worst of circumstances, interference could be caused within a 104 mile radius.

The Commission should not create LMS in the 902-928 MHz band in the form requested by Teletrac. It is infeasible to authorize LMS, as contemplated by Teletrac, due to the presence of millions of Part 15 devices now and more to come in the future. For example, the digital cordless phone is expected to gain wide acceptance by the consuming public and dramatically increase the use of the 902-928 MHz band by Part 15 devices.

Increasing the number of LMS receivers to solve this interference problem will only exacerbate the problem. While such an action could decrease the range that a vehicle would have to transmit to a receiver, it would also place a greater number of receivers much closer to Part 15 users.

Metricom does not understand how the Commission would go about resolving Part 15 interference in favor of LMS. How would the Commission implement an order directing the millions of Part 15 devices in the hands of consumers to cease operations? Part 15 operations are unlicensed and, short of physically removing the offending Part 15 devices, there is no way to force the offending consumers to cease interfering with Teletrac's technology. How will the Commission identify the offending Part 15 device? The source of interference can change minute-by-minute due to the nature of Part 15 devices' intermittent use.

The Commission's proposals are significant changes and are unfair to manufacturers and consumers. Consumers and manufacturers of Part 15 devices may have been chargeable with knowledge of the existence of the interim rules governing AVM that these rules

more spectrum-efficient technologies that can provide this service. The American public does not need another one, particularly one that needs exclusive use of a frequency band to be viable.

The Commission must satisfy itself about the robustness of

If the Commission is intent on creating another location service in the 902-928 MHz band, it should do so only pursuant to such technical standards as will permit Part 15 operations to coexist with LMS in the 902-928 MHz band. Sharing in this band has worked well for everyone, other than Teletrac. The American public has a great variety of services and devices to choose from in this band. The Commission should not reverse this accomplishment by creating a service using a technology that cannot share this spectrum. Rather, the Commission should issue another Notice of Proposed Rulemaking to attempt to establish technical standards and operating parameters that will permit the service to operate simultaneously with other current users of this band, including Part 15 devices.

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COMMENTS
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METRICOM, INC.

Metricom, Inc. ("Metricom"), by its attorneys, hereby submits its comments in response to the Notice of Proposed Rule Making ("Notice") issued in the above-captioned proceeding. In this proceeding, the Commission is proposing to abandon its nearly 20 year old "interim rules" for Automatic Vehicle Monitoring ("AVM") service to create a new Location Monitoring Service ("LMS"). The proposed new service would have an expanded frequency allocation that includes the entire 902-928 MHz frequency band, expanded permissible communications to include messaging and locating services for all animate and inanimate objects, and expanded customer eligibility.

The Commission's proposals in this proceeding would be contrary to the public interest because such operations could seriously restrict Part 15 operations in the 902-928 MHz frequency band, operations which the Commission, up to now, strongly encouraged. As discussed below, Metricom firmly believes that the Commission should not establish a technologically inferior wide-

band LMS standard which could cause Part 15 operations in the 902-928 MHz band to be negatively impacted. For these and other reasons, the Commission should abandon its proposal to significantly expand the wide-band AVM service. The status quo should therefore be maintained. In the alternative, Metricon

communications networks have already been sold to 14 electric utilities, some of which are among the largest in the nation. Additionally, other networks have been or will be installed this year by a major railroad, water treatment facilities and other industries.

2. There has been successful development, substantial installation and proliferation of Part 15 spread spectrum equipment. Metricom is therefore extremely concerned with the Commission's Notice because, if the Notice is implemented as proposed, Part 15 spread spectrum operations could be seriously affected. This would be extremely difficult not only for companies like Metricom, but also for public utilities and other companies, some of which have invested rate-payer monies in Part 15 equipment. Surely, the Commission does not intend such a result after it has encouraged and fostered the development of Part 15 operations in this band.

3. Just as the Commission did when it first visited AVM policies, it must make a determination as to what designs perform most effectively, what type of demand will exist for the service and how such systems could be licensed to best serve the public interest.^{1/} Metricom respectfully submits that if the Commission were to these same determinations in this proceeding, the Commission would not implement LMS as proposed in the Notice.

^{1/} Further Notice of Inquiry and Notice of Proposed Rulemaking, Docket No. 18302, 35 Fcc 2d 692 (1972).

II. WIDE-BAND LMS, AS CONTEMPLATED IN THE NOTICE, CANNOT
CO-EXIST WITHOUT THE THREAT OF SIGNIFICANT INTERFERENCE
WITH PART 15 DEVICES IN THE 902-928 MHz BAND

4. While Metricom believes that the Commission had not intended to deal with Part 15 in this rule making, an examination of the consequences of the proposal leads to the inescapable conclusion that because of interference problems, Part 15 operations would be significantly impacted, if the Commission's proposal is implemented. Accordingly, unless the Commission intends to abandon its established policy of encouraging the development and deployment of Part 15 devices in the public interest,^{2/} it must consider the impact of its proposal on Part 15

^{2/} In its overall frequency allocation policies to promote the more effective and efficient uses of radio in the public interest, the Commission has recognized the importance of, and encouraged, Part 15 operations. In the recent past, the Commission has adopted rules "to facilitate greater flexibility in the design and use of low power, non-licensed spread spectrum systems," (See, generally, Amendment of Parts 2 and 15 of the Rules With Regard to Spread Spectrum Systems, (Report and Order), 8 FCC Rcd 4123 (1990)) because it believed that making the 902-928 MHz band available for Part 15 use would "provide major benefits to both manufacturers and consumers" and create an opportunity for "many new practical uses." (Revision of Part 15 (Notice of Proposed Rule Making), 2 FCC Rcd 6135, 6137 (1987); Revision of Part 15 (First Report and Order), 66 R.R.2d 295, 308 (1989)). Because the Commission believed that "Part 15 spread spectrum technologies offer important new opportunities for developing new short range communications capabilities" the Commission stated:

We desire to encourage the development and implementation of this exciting new family of technologies, and therefore seek to provide a regulatory framework in which there is maximum flexibility for the use of spread spectrum systems consistent with the basic precept of Part 15 rules that non-licensed operations are not to cause harmful interference to established services. Amendment of Parts 2 and 15, supra, at ¶ 8 (emphasis added).

operations in the 902-928 MHz frequency band. The Commission cannot reconcile its desire to continue to achieve its Part 15 goals with its desire to implement the proposal in the Notice.

5. The reason Part 15 operations would be impacted in this band is that the Notice does, de facto, make the North American Teletrac and Location Technologies, Inc. ("Teletrac") wide-band system architecture for LMS the exclusive architecture to provide LMS in the 902-928 MHz band.^{3/} While the Notice does not explicitly state that the Teletrac system architecture will become the standard, an analysis of the Notice, along with an examination of applicable facts, makes this conclusion inescapable.

6. Teletrac's admittedly fragile system architecture has already proven to be susceptible to harmful interference from one of the least likely causes of interference, low power, Part 15 spread spectrum devices. The increasingly wide-spread use of Part

licensee in the country, Teletrac's technology will become the de facto standard for providing LMS in the United States.

will also prevent Teletrac's technology from sharing with the non-licensed users of the 902-928 MHz band.

12. In order to avoid such a disaster, the Commission should permit the status quo to continue because the status quo permits the American public to have the benefit of both AVM and Part 15 services. Granted, AVM is not LMS.^{4/} However, Metricom believes that the American public would rather have AVM as it exists today together with the ability to use Part 15 equipment rather than have an expanded version of AVM and limited ability to use Part 15 devices.

III. THE FCC SHOULD NOT CREATE LMS IN THE 902-928
MHZ BAND IN THE FORM REQUESTED BY TELETRAC

- A. It Is Infeasible To Authorize LMS, As Contemplated
By Teletrac, Due To The Presence Of Millions Of
Part 15 Devices Now And More To Come In The Future

13. As noted by the Commission at paragraph 23 of the Notice, the Commission has authorized Part 15 devices to operate in the 902-928 MHz band. The Commission has, in the last three years, completed a series of rule makings in conjunction with its rewrite of Part 15 in which it facilitated and encouraged the expanded use of unlicensed devices at 902-928 MHz.^{5/} In addition, amateur

^{4/} It must be noted, however, that there are other available services which provide the same type location service as proposed by LMS.

^{5/} First Report and Order, Gen. Docket No. 81-413, 101 FCC 2d 419 (1985); First Report and Order, Gen. Docket No. 87-389, 4 FCC Rcd. 3493 (1989); Report and Order, Gen. Docket No. 89-354, 5 FCC Rcd. 4123 (1990).

operations are licensed in this frequency.^{6/} As noted at paragraph 24 of the Notice, not only is there a substantial presence of Part 15 devices in the 902-928 MHz band, but that presence is likely to increase substantially as new, consumer-oriented Part 15 devices, including new, one watt, spread spectrum, digital cordless telephones and wireless office systems are introduced.^{7/} These new telephones will have greater range and improved privacy over their conventional, analog cordless predecessors. Given the wide-spread acceptance of conventional, analog cordless telephones (which are generally considered to be greatly inferior to the new generation of digital cordless telephones), there can be no doubt that the introduction of these digital cordless telephones will have a very significant impact on the use of the 902-928 MHz band. In sum, 902-928 MHz is not virgin spectrum; it is inherently a shared band already occupied by a plethora of useful services with substantially more to come in the future.

14. As Part 15 devices continue to proliferate in the 902-928 MHz band, interference with Teletrac's systems will also increase. One "common sense approach" to mitigate this interference problem to LMS systems would be to install more receiver sites, thereby increasing the density of receivers in the LMS systems. In

^{6/} See 47 C.F.R. § 97.301.

^{7/} The Electronic Industries Association ("EIA") estimates that approximately 44.1 million households currently use cordless telephones, and that the current trend in sales indicates there will be expanded usage.

practice, however, this is a double-edged sword. While such an action could decrease the range that a vehicle would have to transmit to a receiver, it would also place a greater number of receivers much closer to Part 15 users (especially consumers) because many Teletrac receive sites are presently located at remote sites, typically removed from the urban and suburban metropolitan areas.

15. Assuming, arguendo, that Metricom is correct and there will be massive and widespread interference between Part 15 devices and LMS, Metricom does not understand how the Commission would go about resolving this interference in favor of LMS. While Metricom is fully cognizant of the Commission's requirement that Part 15 devices cannot cause interference to licensed users of the 902-928 MHz band, Metricom does not understand how the Commission would implement an order directing the millions of Part 15 devices that are currently (and will increasingly be) in the hands of consumers to cease operations. As the Commission well knows, all Part 15 operations are unlicensed and, short of physically removing the offending Part 15 equipment from virtually every home and business in the United States, there is no way to force the offending consumers to cease interfering with Teletrac's technology. Furthermore, it will be extremely difficult to identify which Part 15 device is actually causing the interference. The task of identifying the culprit will worsen with the continued introduction of Part 15 devices because the source of interference can change

minute-by-minute due to the nature of Part 15 devices' intermittent use. A good example of such an intermittently used Part 15 device is the new digital cordless phone.

16. The Commission has made a policy decision that Part 15 devices should operate in the 902-928 MHz band. Pursuant to this decision, the Commission has created a substantial industry in this band with the attendant substantial investment in Part 15 devices by both the American public and manufacturers of Part 15 devices. These substantial investments by manufacturers are continuing as evidenced by the introduction of many new devices, including the new, digital, cordless telephones. Substantial investments by consumers will also, no doubt, continue as a result of the introduction of new and better Part 15 devices. Metricom respectfully submits that any Commission decision to locate LMS in the 902-928 MHz band cannot ignore but, rather, must take into account, and allow for the fact that millions of Part 15 devices are now operating in this band on an unlicensed and, therefore, unaccountable basis, and that these devices will either make Teletrac's version of LMS virtually unusable in this band, or Teletrac's operations will make many Part 15 operations unusable in this band.^{8/}

^{8/} Furthermore, the Commission must determine where it will find the human and fiscal resources necessary to deal with the huge public outcry that will emanate from angry consumers and businesses (and their congressional representatives) because they cannot use their Part 15 devices as a result of the interference to those devices caused by Teletrac's LMS operations. Because there are a
(continued...)

17. Metricom is not here arguing the relative legal rights of licensees in the 902-928 MHz band versus Part 15 users. As noted above, Metricom is cognizant of the Commission's policies requiring Part 15 devices to accept interference from, and not cause interference to, licensed operators.^{2/} Rather, Metricom is attempting to illuminate the issue of the impossibility of enforcing any clearing of Part 15 devices from the 902-928 MHz band which could be necessary to permit interference-free operations by LMS as contemplated by Teletrac.

**B. The FCC's Proposals Represent A Significant Change
And Are Unfair To Manufacturers And Consumers Of
Part 15 Devices**

18. Consumers of Part 15 devices never had any warning, nor could they have reasonably foreseen, that just a few years after encouraging Part 15 development in the 902-928 MHz band, the Commission would propose to greatly expand the scope of permissible activities within the band to accommodate the widespread deployment of technology that can only function in an extremely quiet RF environment -- necessitating the limitation of Part 15 operations in the band. Indeed, such a proposal is flatly inconsistent with

^{3/} (...continued)
substantial number of such devices in the hands of the American public, even if only a tiny fraction of such consumers and businesses file complaints with the FCC, responding to the complaints of this tiny fraction, will involve a substantial commitment of resources.

^{2/} See, 47 CFR Sec. 15.5.

statements made by the Commission at the time it was encouraging new Part 15 technology development within the band.

19. In 1984, when the Commission first proposed rules to authorize unlicensed spread spectrum operations, it noted that the 902-928 MHz band appeared to provide an "excellent proving ground" for the such operations because of the low probability of interference to licensed services. Although some ISM manufacturers objected to the proposed authorization, the possibility of interference being caused to AVM services was not even mentioned:

The majority of comments favored allowing
spread spectrum systems to operate in these

20. In 1985, when the FCC authorized spread spectrum operations in the 902-928 MHz band, the Commission noted that its new rules were being kept "deliberately conservative in order to minimize any possibility of interference to . . . existing services."^{12/} Later, when the FCC was considering the authorization of additional Part 15 services within the band, the Commission discussed the possibility of interference to ISM services. Again, the possibility of interference to AVM services

22. In sum, when consumers invested in the development of new Part 15 products, they may have been chargeable with knowledge of the existence of the interim rules governing AVM systems. They may also have been chargeable with knowledge that those rules might be made permanent, and that the number of AVM systems operating within the band might become more prevalent. However, there was never any indication that a radical expansion of the AVM service and authorized frequencies, using a highly interference-prone technology -- one that could severely impact Part 15 operations -- as proposed in the Notice, would be forthcoming. To the contrary, the Commission made it clear that Part 15 manufacturers and consumers should be concerned with "established" services within the band:

We desire to encourage the development and implementation of this exciting new family of technologies, and therefore seek to provide a regulatory framework in which there is maximum flexibility for the use of spread spectrum systems consistent with the basic precept of Part 15 rules that non-licensed operations are not to cause harmful interference to established services. [Emphasis added.]^{15/}

23. Metricom is fully cognizant of the secondary status of Part 15 devices under the current rules. It also recognizes that the Commission has discretion and authority to allocate spectrum to new services. However, manufacturers and consumers have a right to expect that any change in the rules affecting the operation of

^{15/} Report and Order, Gen. Docket 89-354, 5 FCC Rcd. 4123, 4124 (1990).

unlicensed RF devices will be based upon reasoned decision making. To the extent proposals in the Notice result in Part 15 devices being made potentially less useful after years of Commission encouragement, Metricom does not believe the proposals in the Notice are either fair or reasonable.

C. The Commission Must Not Endorse Teletrac's
Inferior Technology By Making Teletrac's
Technology The De Facto LMS Standard

24. Metricom submits that the technology utilized by Teletrac to provide AVM services does not employ the most current technology and is spectrum-inefficient. Providing an accurate vehicle location service does not require a system using more wide bandwidth. The use of direct sequence and time of arrival to determine a vehicle's location is already implemented in existing systems today. For example, the global positioning satellite (GPS) system is now fully operational and is intended to be used commercially for the purpose of location. It is very accurate (approximately +/- 100 feet) and is supported by the U.S. Department of Defense. There are many companies providing GPS receiver units at a nominal cost. Since the bandwidth for GPS is already in existence (near 1600 MHz) and is allocated on an exclusive basis, there are no interference issues as with LMS operating in the 902-928 MHz spectrum. Why add yet another wideband positioning system? Using GPS, a system could be very simply created that communicates to the vehicle's GPS receiver

using narrow band and spectrum-efficient radio communications that would interrogate the GPS unit's latitude and longitude. The latitude and longitude is absolute and would take less than 50 bytes of data for on-the-air transmission. The cost of the supporting infrastructure would be significantly less than the cumbersome Teletrac LMS proposal.

25. The public is not served by using up significantly more spectrum on an exclusive basis. Redundant spectrum allocations, such as proposed in the Notice, are inefficient and do not serve the public interest, nor do they comply with the Commission's mandate to provide new and efficient communications services to the people of the United States.^{16/}

26. Teletrac's technology might have been appropriate in 1974 when the Commission's interim rules were adopted, but in the last decade of this technologically innovative millennium, Teletrac's technology is most inappropriate. Changing the Commission's interim rules, adopted in 1974, to permanent rules which embrace Teletrac's technology is a great disservice to spectrum efficiency. Even Teletrac's Petition at pages 26-32 makes plain that its request for an exclusive allocation of spectrum is a regulatory fix to cure a technological weakness in its system design. Creation of LMS, as envisioned by Teletrac, would reward Teletrac's unproductive technology with favored access to scarce spectrum.

^{16/} See, 47 U.S.C. § 151 and 157(a).

The fragility of Teletrac's system architecture should not lead to exclusive use by Teletrac's system of the 902-928 MHz band.

27. AVM can be provided in a much more spectrally efficient manner by newer technologies. Such technologies include the Global Positioning System, Loran C and dead reckoning systems. Furthermore, "Lo-Jack" is currently providing AVM in another part of the radio spectrum. Given the adverse affect that Teletrac's AVM system will have on Part 15 devices, Metricom submits that it is wasteful to allocate 16 MHz of spectrum to a service already being provided in another part of the spectrum utilizing more spectrum-efficient technologies. This is particularly true given the fact that Teletrac has not shown any demand for its system. After almost 20 years of AVM authorization, Metricom believes that Teletrac has only about 60 transmitters nationwide and fewer than 6,000 subscribers. Since adoption of the Commission's interim AVM rules, this is an average addition of 3 transmitters a year and 300 subscribers a year. This is not much of a business, and it certainly provides no justification for an allocation of 16 MHz of very precious frequency spectrum. What is really outrageous is that not only is there no demand for LMS as evidenced by Teletrac's lack of subscribers, Teletrac admits that it does not intend to use all 8 MHz of spectrum it would be authorized pursuant to the Notice. Rather, Teletrac intends to use only 4 MHz, saving the

maintaining a MUR for additional subscribers if and when such